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Morphological Oddity Mandibular Right Second Premolar with Two Roots: A Case Report

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Abstract

Introduction: The basis of successful endodontic therapy resides on sound and thorough knowledge of the root canal anatomy, its variations and the clinical skills. Mandibular premolars usually have single root with single root canal system. However numerous studies related to anatomic variations of mandibular premolar have been be reported. The incidence of two roots in these teeth are quite rare. This report presents the clinical management of mandibular second premolar having two roots with apical delta in buccal root diagnosed by CBCT.

Conclusion: The presence of extra canals should be thought of in every tooth undergoing endodontic treatment. This would help in reducing endodontic failure due to incomplete obturation. CBCT is a useful diagnostic tool in endodontics.

Keywords: Mandibular second premolar, root canal configuration, anatomic variation, Apical delta.

Introduction

A thorough knowledge of the basic root canal anatomy and its possible variations is essential for achieving successful nonsurgical endodontic treatment. Investigators have reported multiple foramina, fins, deltas, loops, furcation's, and accessory canals in most teeth.[1] The main reasons of endodontic failures are apical percolation and the presence of microorganisms caused by incomplete cleaning, insufficient canal obturation, and presence of untreated canals.[2]

Anatomically lower second premolars are described as teeth with single root and single root canal[3]. However, they could be the most challenging to treat due to the failure to identify the complex variations in their root canal morphology. The ovoid shaped root in cross section normally has developmental grooves or depressions on the mesial and distal surfaces[4].The incidence of two roots and two canals in the mandibular second premolar was 0.0-0.4% & 13.5-20% respectively.[5]

The apical delta is an intricate system within the root canal and incomplete debridement may affect the long-term prognosis of root canal therapy.[6]

This report presents the clinical management of mandibular second premolar having two roots with apical delta in buccal root diagnosed by CBCT.

Case Report

A 33-year-old female patient, with a non-contributory medical history, reported to the Department of Conservative Dentistry and Endodontics Government Dental College and Hospital, Aurangabad, with pain in his

lower right second premolar (45). (45). The pain was spontaneous, increased on lying down, and present for the past 2 days. Clinical and radiographic (Figure-I A) examination revealed a deep carious lesion in the same tooth Vitality testing with dry ice (R C Ice, Prime Dental) caused severe lingering pain. A diagnosis of symptomatic irreversible pulpitis was made and it was decided to carry out endodontic treatment in second premolar. Cone beam computerized tomography was performed for better understanding of the root morphology (Figure 4, 5, 6)

Local anaesthesia was achieved by administration of inferior alveolar nerve block with 2% lidocaine; the premolar was isolated under rubber dam (Hygenic-Coltene Whaledent). Following excavation of caries a conventional access cavity was prepared with Endo Access bur FG1 (Dentsply Maillefer, Switzerland). Clinical examination with a DG 16 explorer (Hu-Friedy, USA) revealed two orifices. (Figure-I B, C, D). The access cavity was modified slightly to expose the two orifices. Working length radiographs (Figure-I C) revealed two separate canals with two separate roots & apical delta in buccal root. (Figure-**1** C, Figure-**2** 1,2,3,4) apical delta cleaning shaping done with K file Main canal 30 number file accessory canal with 25 number apical preparation. Then canals were instrumented with Protaper gold (Dentsply Maillefer, Swiss made), using EDTA (Dentsply Maillefer, USA) as lubricant. An apical preparation till F3 (6%) was carried out. The canals were irrigated using normal saline and 5.2% sodium hypochlorite (Prime Dental products, India). After confirming the master cone (Dentsply, India) by radiographs (Figure-**1** D) the canals were dried using paper points (Dentsply, India) and obturated by lateral condensation technique using AH26 (DeTrey/Dentsply, Germany) as sealer. (Figure-**1** E) A temporary dressing (Cavit G, 3M ESPE, Germany) was given and a radiograph was taken. Apical delta filling is evedent from (Figure-**2** 3)

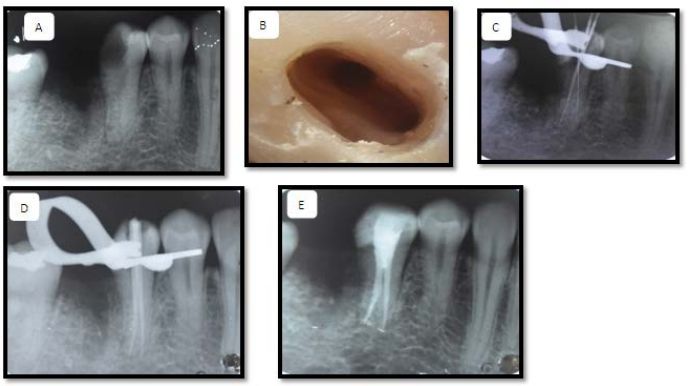

Figure- 1 A) Preoperative radiograph of two-rooted 2nd premolar molar; B) Access cavity reveals one buccal and one lingual canal; C) Working length radiograph; D) The master apical cones confirmed the measured lengths; E) Post obturation Intraoral periapical radiograph.

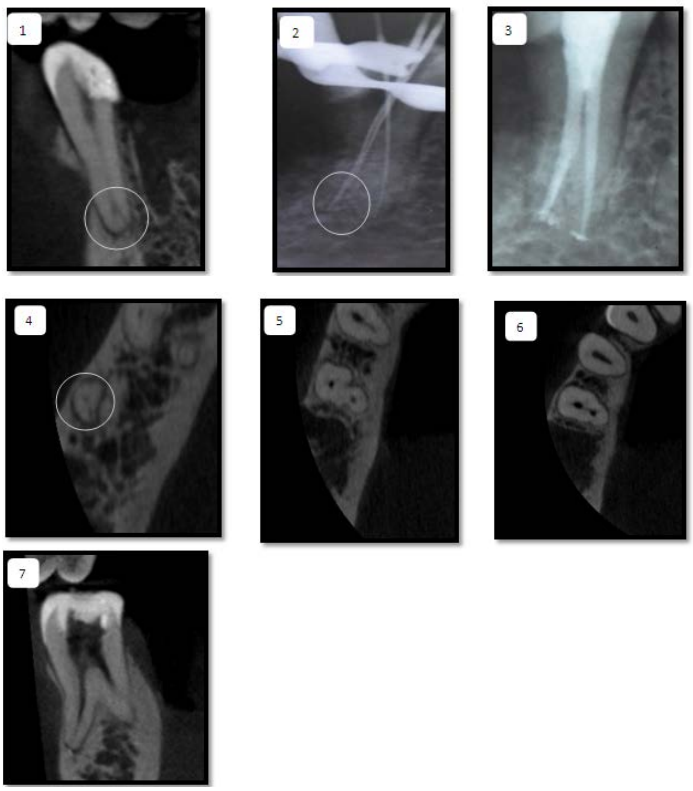

Figure-2 **1)** CBCT section showing apical delta with buccal root; **2)** IOPR x-ray showing apical delta in buccal root, two k files in same root one in main canal and another in accessory canal; **3)** obturated apical delta; **4)** CBCT transverse section of buccal root showing one main

& another accessory canal i.e. apical delta; **5)** middle 1/3 of root transverse CBCT section showing two canals & two roots; **6)** coronal 1/3 of root transverse CBCT section showing two canals & two roots; **7)** CBCT labiolingual section showing buccal & lingual root.

Discussion

Recognition of the aberrant anatomy requires thorough knowledge of the root canal morphology, critical interpretation of the diagnostic aids, appropriate assessment of the pulp chamber floor and operative skills of the clinician.[7]

Slowey [8] has shown that when the root canal shadow suddenly stops in the radicular region on radiograph, bifurcation or trifurcation of the canal at that point should be suspected. Also, an additional root canal can be identified when the root outline is unclear or has an unusual contour, or deviates from the normal appearance on radiograph.

Lu et al. are similar to Slowey suggestions that mandibular premolars are the most difficult to treat endodontically and also the apical configuration of these teeth was found to be complex. [10]

Mandibular second premolars mostly have a single root. The incidence of 2 or more roots is low, approximately 0.4%, whereas in mandibular first premolar it is 2.1%. Majority of the mandibular premolars have a single canal, but approximately 9% have 2 or more canals. A single apical foramen might be found in mandibular teeth in more than 9 out of ten cases, but 2 or more foramina may occur approximately 8.2% of the time. The incidence of more than 1 root, more than 1 canal, and more than 1 foramen is less frequent in the mandibular second premolar than in the mandibular first premolar. [11]

The variability in root canal morphology is a usual phenomenon. Radiographs taken at different horizontal angulations facilitate searching for additional roots and canals. If a radiolucent line is present mesial or distal to the main canal,an additional canal should be suspected. Magnification and fibre optic illumination are helpful in increasing the optical field. Tactile examination of the walls of the major canal witha small precurved file tip is mandatory, even in cases which appear to have only one canal radiographically.[10]

Cone Beam Computed Tomography gives 3D Appraisal to diagnose morphologic variation in anatomy of tooth, it is a useful tool during treating complex anatomy of tooth.

Conclusion

The presence of extra canals should be thought of in every tooth undergoing endodontic treatment. This would help in reducing endodontic failure due to incomplete obturation. CBCT is a useful diagnostic tool in endodontics.

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